IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Art Unit	:	3661
Examiner	:	Gertrude A. Jeanglaude
Appln. No.	:	10/722,706
Applicant	:	Peter J. Schubert
Filing Date	:	November 23, 2003
Confirmation No.	:	7484
For	:	VEHICLE ROLLOVER SENSING USING ANGULAR ACCELEROMETER

REPLY BRIEF UNDER 37 C.F.R. §41.41

This Brief is in reply to the Examiner's Second Answer mailed on January 23, 2007. The Examiner's Second Answer appears to be substantially identical to the first answer, and Applicants have presumed that the Examiner intended to file a Supplemental Examiner's Answer. This Brief addresses the arguments raised in the Examiner's Answers. This Reply Brief contains these items under the following headings, and in the order set forth below (37 C.F.R. §41.37(c)):

    I. Status of Claims

    II. Grounds of Rejection to be Reviewed on Appeal

    III. Argument

I.   Status of Claims

This is an appeal from a final rejection of claims 1-31. Claims 1-31 were originally presented and have not been amended. No claims currently stand allowed. Appealed claims 1-31 are attached in the Appendix hereto.

II.   Grounds of Rejection to be Reviewed on Appeal

Whether claims 1-31 are unpatentable under 35 U.S.C. §102(b) as being anticipated by U.S. Patent No. 6,192,305 to Schiffmann.

III.   Argument

The Examiner has essentially repeated the rejection of claims 1-31 under 35 U.S.C. §102(b) as being anticipated by U.S. Patent No. 6,192,305 to Schiffmann. In response to Appellant's argument presented in the Appeal Brief filed on March 31, 2006, the Examiner disagreed with Appellant's argument because the reference to Schiffmann discloses an angular accelerometer as stated in the Office Action. In the Examiner Answers, specifically stated that the function of the angular accelerometer, as stated in the claim 1, is to sense angular acceleration and to produce an output signal, and that it is shown in column 12 and 13 that Schiffmann discloses angular acceleration, and therefore it is known to Schiffmann to employ an angular accelerometer to sense angular acceleration.

The Examiner has again failed to point to any <u>angular accelerometer</u> in the rollover sensing module 10 of Schiffmann. Instead, the Examiner simply points to a recitation of an angular acceleration which is essentially an estimated angular acceleration as estimated by taking the time derivative of a measured rate signal which is sensed with a <u>rate sensor</u> (see column 13, lines 18-23 and block 294 of FIG. 2 of Schiffmann). Schiffmann discloses five sensors with outputs that are recorded (see column 13, lines 3 and 4). The two rate sensors and three linear accelerometers shown in Schiffmann are clearly not angular accelerometers.

The Examiner further answered Appellant's Appeal Brief with a statement that Schiffmann discloses a pitch angle in FIG. 2 and an integrator 108 for integrating sensed angular acceleration signal and producing an angular rate, citing column 13, lines 16-23. In reply, Appellant submits the integrator 108 of Schiffmann does not <u>integrate a sensed angular acceleration signal and produce an angular rate</u>. Instead, the integrator 108 of Schiffmann is a pitch angular integrator (see column 13, lines 12-13) that estimates pitch angle (see column 13, lines 16-19). Integrator 108 essentially <u>receives rate and angle information and outputs updated estimates of current pitch and roll angles</u>. Nowhere does the integrator 108 integrate angular acceleration to obtain an angular rate, which is the rate of change of an angle. Appellant submits that the Examiner has mischaracterized the Schiffmann patent by alleging that Schiffmann discloses (1) an angular accelerometer and (2) an integrator for integrating

sensed angular acceleration signal and producing an angular rate, for use in a roll angle estimation apparatus as set forth in Appellant's claims.

Accordingly, for at least the reasons presented above, when properly considering the cited reference to Schiffmann, the pending claims are not anticipated by Schiffmann and define patentable subject matter. Appellant respectfully requests that the Examiner's rejection of claims 1-31 under 35 U.S.C. §102(b) be reversed, and that the application be passed to issuance forthwith.

If there is any fee due in connection with the filing of this Statement, please charge the fee to our Deposit Account No. 16-2463.

Respectfully submitted,

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Date

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1. (original)   A roll angle estimation apparatus for predicting a future roll angle of a vehicle, said apparatus comprising:

an angular accelerometer for sensing angular acceleration of a vehicle and producing an output signal indicative thereof;

an integrator for integrating the sensed angular acceleration signal and producing an angular rate; and

a predictor for predicting a future roll angle of the vehicle as a function of the sensed angular acceleration, the angular rate, and a current roll angle.

2. (original)   The apparatus as defined in claim 1, wherein the current roll angle is determined by integrating the angular rate.

3. (original)   The apparatus as defined in claim 2, wherein the predictor comprises a Taylor series-based predictor for predicting the future roll angle as a quadratic extrapolation.

4. (original)   The apparatus as defined in claim 1, wherein the angular accelerometer senses roll angular acceleration about a longitudinal axis of the vehicle, and said predictor predicts the future roll angle about the longitudinal axis.

5. (original)   The apparatus as defined in claim 1, wherein said integrator and predictor are performed by a controller.

6. (original)   The apparatus as defined in claim 5, wherein said controller further compares the predicted future roll angle to a threshold value and predicts an anticipated vehicle overturn condition based on the comparison.

7. (original)   The apparatus as defined in claim 1, wherein the predictor performs a quadratic extrapolation.

8. (original) The apparatus as defined in claim 1, wherein the integrator performs a numerical integration of the angular acceleration signal based on time steps that vary as a function of rate of change of the acceleration signal.

9. (original) The apparatus as defined in claim 1, wherein the integrator performs a numerical integration of the angular acceleration signal based on time steps that vary as a function of magnitude of the acceleration signal.

10. (original) A rollover sensing apparatus for predicting an overturn condition for a vehicle, comprising:

an angular accelerometer for sensing angular acceleration of a vehicle and producing an output signal indicative thereof;

an integrator for integrating the sensed angular acceleration signal and producing an angular rate;

a predictor for predicting a future roll angle of the vehicle as a function of the sensed angular acceleration, the angular rate, and a current roll angle;

a comparator for comparing the predicted future roll angle to a threshold value; and

an output for generating an output signal indicative of an anticipated vehicle overturn condition prediction based on said comparison.

11. (original) The apparatus as defined in claim 10, wherein the current roll angle is determined by integrating the angular rate.

12. (original) The apparatus as defined in claim 11, wherein the predictor comprises a Taylor series-based predictor for predicting the future roll angle as a quadratic extrapolation.

13. (original) The apparatus as defined in claim 10, wherein the angular accelerometer senses roll angular acceleration about a longitudinal axis of the vehicle, and said predictor predicts the future roll angle about the longitudinal axis.

14. (original) The apparatus as defined in claim 10, wherein said integrator, predictor, and comparator are performed by a controller.

15. (original) The apparatus as defined in claim 10, wherein the predictor performs a quadratic extrapolation.

16. (original) The apparatus as defined in claim 10, wherein the integrator performs a numerical integration of the angular acceleration signal based on time steps that vary as a function of rate of change of the acceleration signal.

17. (original) The apparatus as defined in claim 10, wherein the integrator performs a numerical integration of the angular acceleration signal based on time steps that vary as a function of magnitude of the acceleration signal.

18. (original) A method for estimating a future roll angle of a vehicle, said method comprising the steps of:

sensing angular acceleration of a vehicle and producing an output signal indicative thereof;

integrating the sensed angular acceleration signal to generate an angular rate;

obtaining a current roll angle;

predicting a future roll angle as a function of the sensed angular acceleration, the angular rate, and the current roll angle.

19. (original) The method as defined in claim 18, wherein the step of obtaining the current roll angle comprises integrating the angular rate.

20. (original) The method as defined in claim 18 further comprising the steps of:

comparing the predicted future roll angle to a threshold value; and

generating a vehicle overturn condition signal based on said comparison.

21. (original) The method as defined in claim 18, wherein said step of integrating comprises:

determining a rate of change of the acceleration signal;

computing a time step as a function of the rate of change of the acceleration signal; and

performing numerical integration of the acceleration signal based on the computed time step.

22. (original) The method as defined in claim 18, wherein the step of integrating comprises:

determining a magnitude of the acceleration signal;

computing a time step as a function of magnitude of the acceleration signal; and

performing numerical integration of the acceleration signal based on the computed time step.

23. (original) The method as defined in claim 18, wherein the step of sensing angular acceleration comprises sensing roll angular acceleration about a longitudinal axis of the vehicle.

24. (original) The method as defined in claim 18, wherein the step of predicting a future roll angle comprises computing a Taylor-series quadratic function.

25. (original) A method for predicting an overturn condition of a vehicle, said method comprising the steps of:

sensing angular acceleration of a vehicle and producing an output signal indicative thereof;

integrating the sensed angular acceleration signal and producing an angular rate;

obtaining a current roll angle;

predicting a future roll angle as a function of said sensed angular acceleration, said angular rate, and said current roll angle;

comparing the predicted future roll angle to a threshold value; and

generating a vehicle overturn condition signal based on said comparison.

26. (original) The method as defined in claim 25, wherein the step of obtaining the current roll angle comprises integrating the angular rate.

27. (original) The method as defined in claim 25 further comprising the steps of:
comparing the predicted future roll angle to a threshold value; and
deploying a vehicle overturn condition based on said comparison.

28. (original) The method as defined in claim 25, wherein said step of integrating comprises:
determining a rate of change of the acceleration signal;
computing a time step as a function of the rate of change; and
performing numerical integration of the acceleration signal based on the computed time step.

29. (original) The method as defined in claim 25, wherein the step of integrating comprises:
determining a magnitude of the acceleration signal;
computing a time step as a function of magnitude of the acceleration signal; and
performing numerical integration of the acceleration signal based on the computed time step.

30. (original) The method as defined in claim 25, wherein the step of sensing angular acceleration comprises sensing roll angular acceleration about a longitudinal axis of the vehicle.

31. (original) The method as defined in claim 25, wherein the step of predicting a future attitude angle comprises computing a Taylor-series quadratic function.